WIRE LAYING PROCEDURE FOR MuTr STATIONS 2&3 OCTANTS

procedure name

PHENIX Procedure No. PP-2.5.2.12-04

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REVISION CONTROL SHEET

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A	First Issue	9/1/1999	n/a	R. Towell, W. Lenz, A. Etkin	n/a
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Procedure for wire laying on Muon Tracking Station 2 and Station 3 Octants

1. Purpose and Scope
   1.1. This procedure describes the proper operation of the two wire winding machines in the Muon Tracker tent to lay wires and solder them on the station 2 and 3 octants.
2. Responsibilities
   2.1. Only people properly trained on the operation of these machines may use them. Rusty Towell is the authorized person to approve people to operate these machines. Dave Lee is his alternate.
3. Prerequisites
   3.1. Before entering the clean room put on booties, white coat, and white bonnet.
   3.2. The emergency stop tests must be current according to PHENIX Procedure Number PP-2.5.2.12-06.
4. Precautions
   4.1. Prior to operation the operator must announce that he/she is preparing to move the boom to all persons in the area
5. Electrical and gas setup
   5.1. Below is a diagram of the basic electrical and gas setup.

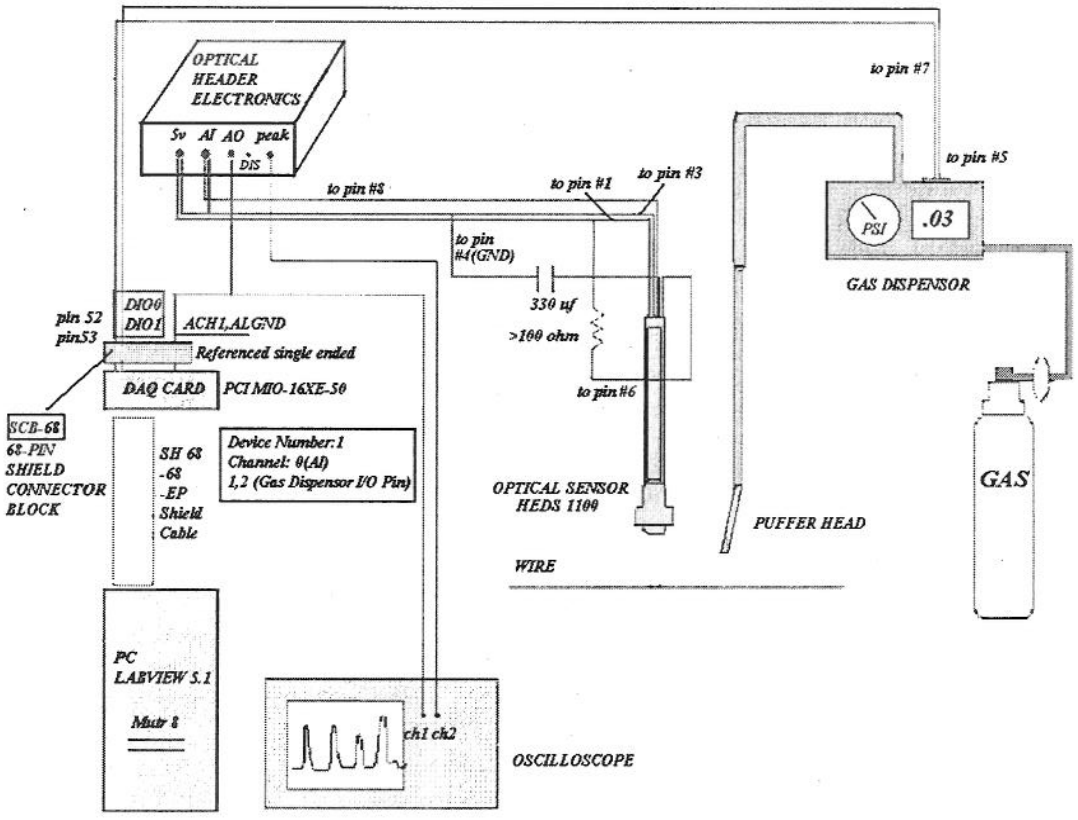

Figure 1 (Electrical and gas setup)

6. EMERGENCY STOP
   6.1. There is a gray box with a large red push-button on top, set on the table just in front of the tower (figure 2). If it is necessary to stop motion immediately, this button may be pushed in order to cut power to the motor.
   6.2. There are also two smaller metal boxes with red buttons that can be pressed to stop motion of the carriage along the boom. These are located on the farthest end of the boom, and between the tower and the gray power cutoff box (figures 2 and 3).
   6.3. The emergency stop buttons must be tested according to PHENIX Procedure Number PP-2.5.2.12-06.

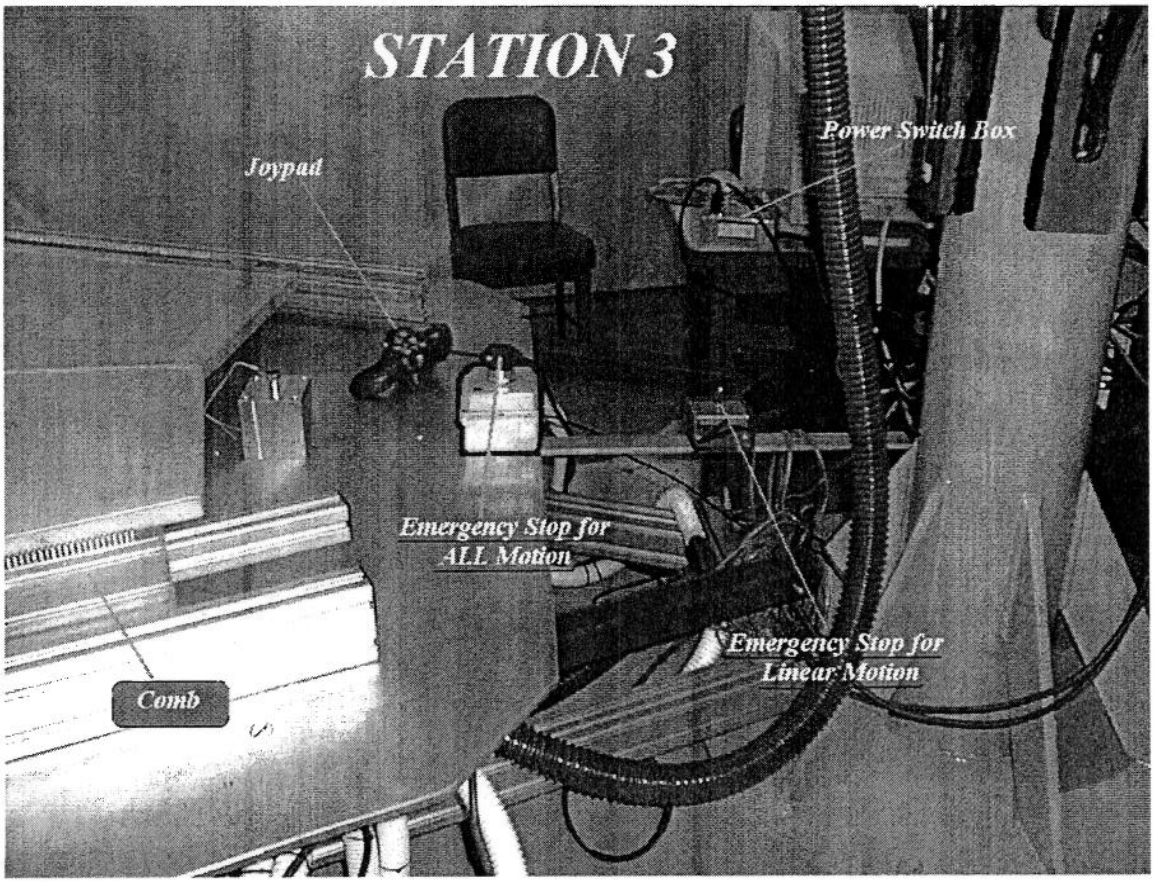

Figure 2 (Station 3, two emergency stops shown)

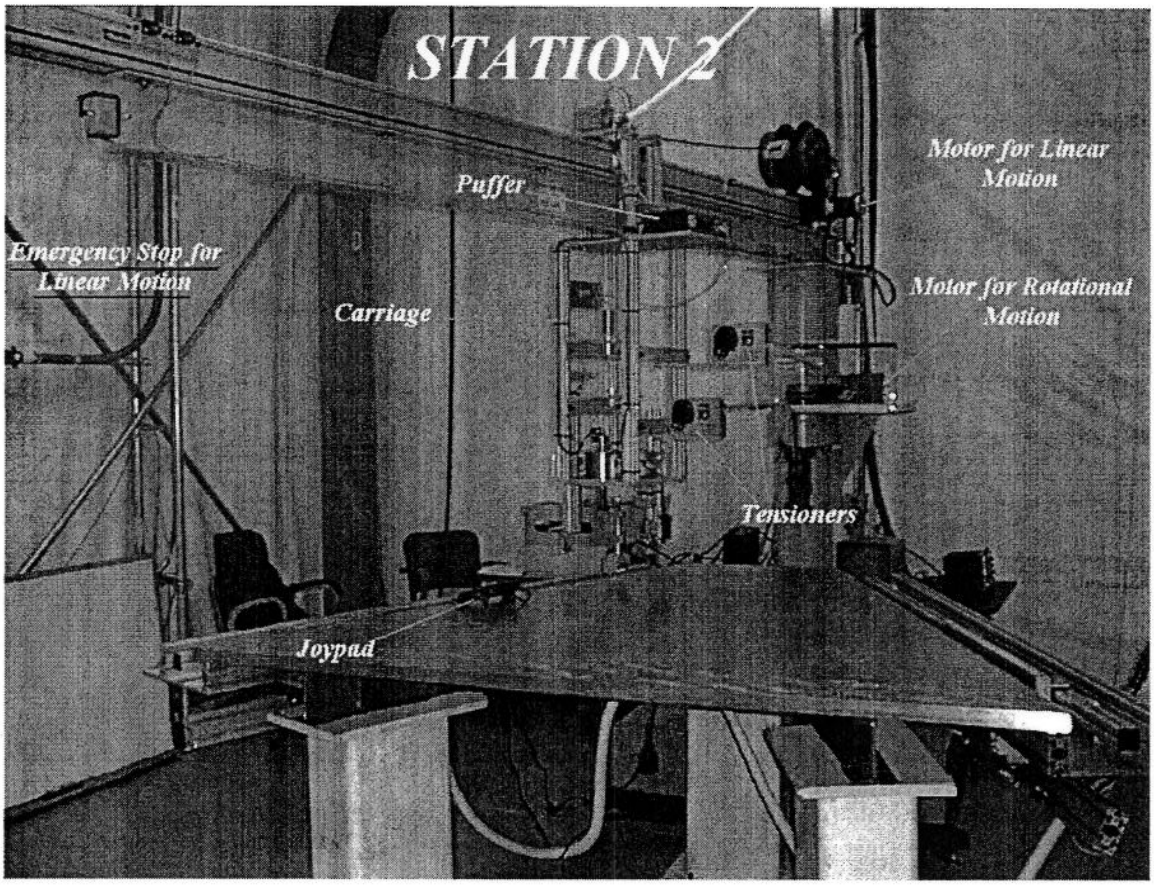

Figure 3 (Station 2, one emergency stop shown)

7. Initial setup of wire laying head
   7.1. Turn the brake power on.
   7.2. Set the wire-tension brakes by :
      7.2.1. Finding the end of the field wire on the spool, and gently pulling the wire out and attaching the 75gram weight to it.
      7.2.2. The wire should then be laid over the white tensioning spool, and over the pulley at the end of the tensioner (figure 4).
      7.2.3. Set the current at the maximum possible value on the dial, then adjust the voltage setting until the weight hangs without dropping. Then decrease the voltage until the weight drops freely, but without excessive acceleration.
      7.2.4. Repeat the above procedure to set the anode brake, using the 50gram weight.
   7.3. Once the brakes are set, set the tension by:
      7.3.1. Wrapping the field wire three times around the white spool on its tensioner, and
      7.3.2. Wrapping the anode wire four times around the white spool on its tensioner

7.3.3. For both wires, hang the weighted ends over the back-tension pulleys, and adjust the large black tension dials until the weights remain still, but so that they will begin falling if the dial settings are decreased at all.

7.3.4. Once the above procedure is completed remove the weights, and run both wires over the back-tension arm pulleys, and through the wire-laying head pulley, with the field wire to the side nearest the tower.

7.4. From the pulley, bring the wires out to the clamp and fix them.

7.5. Make sure that the clamp is as far up as it can go, that it is in line with the wire-laying head, and that the wire-laying head is down. (The clamp must be in line with the head so that the wires can not hit the comb pins.)

7.6. Set the level of the wire-laying head so that it makes contact with the center pin strip, but is above the cathode-strip panel itself.

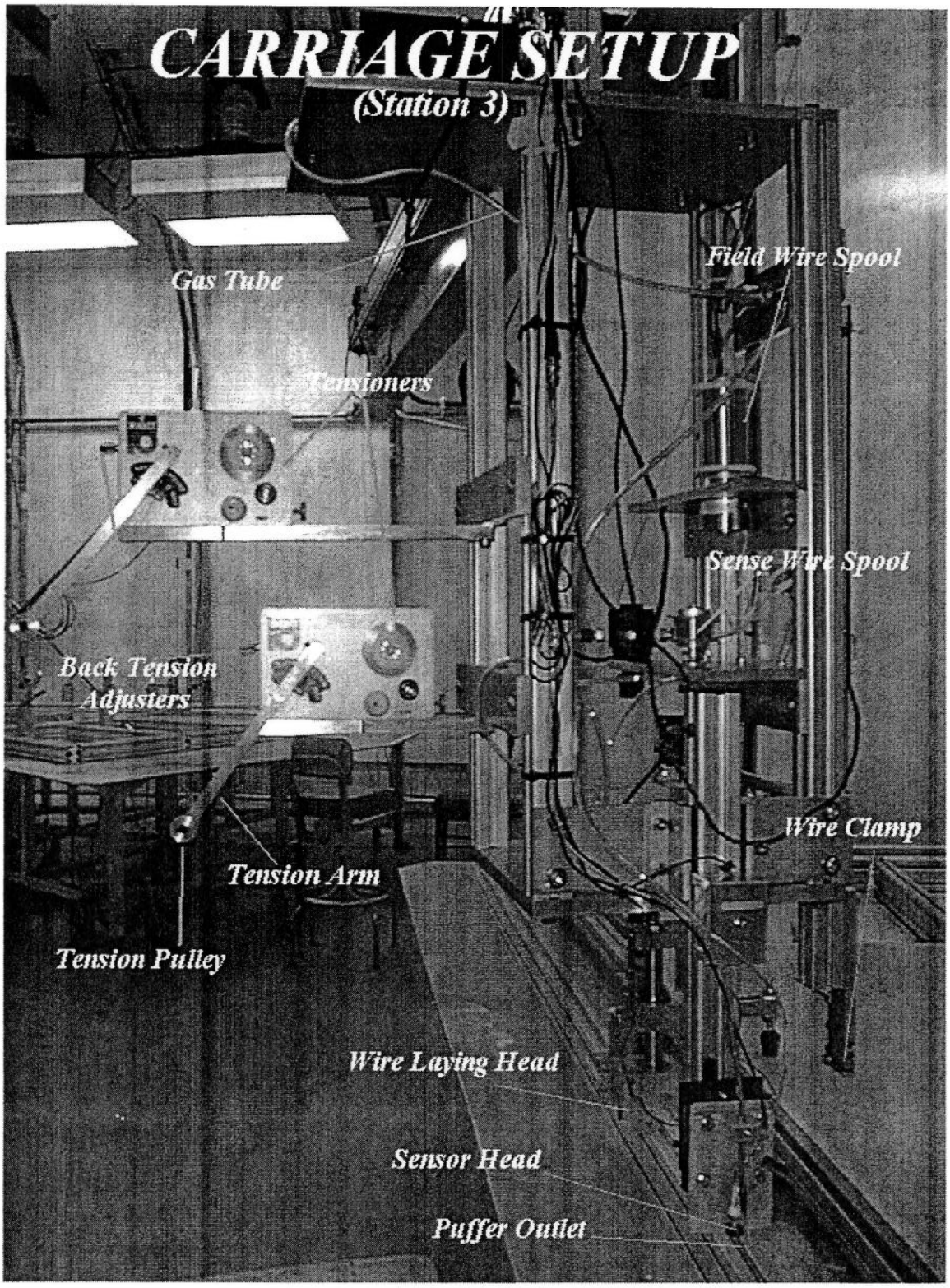

Figure 4 (Carriage Setup for Station 3)

8. Positioning the wire laying head
   8.1. Turn on the two motor controller boxes.
   8.2. Click on the "Station2(3) Running" icon shown on the screen; all programs screen below will appear.

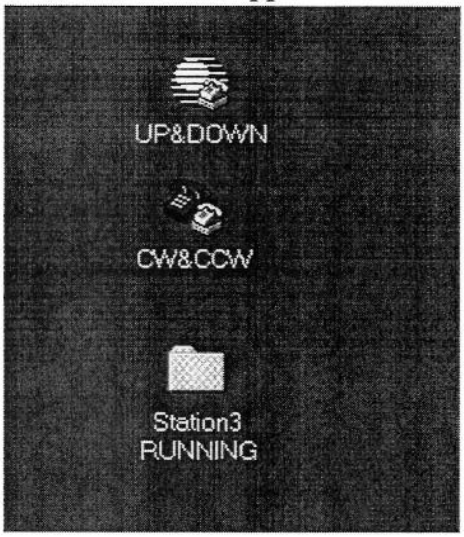

Figure 5 (Station2(3) Running)

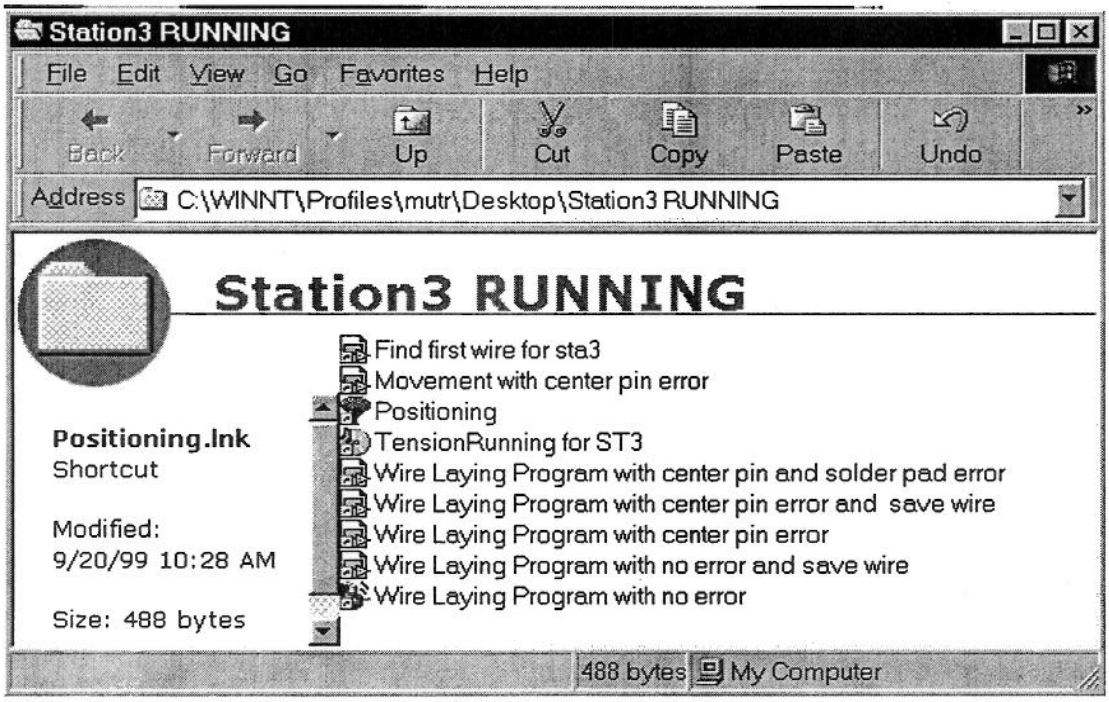

Figure 6 (All programs to use)

8.3. Click on the button labeled "Positioning". The positioning program will appear with a black arrow in the corner. Click on the arrow so that it turns white.

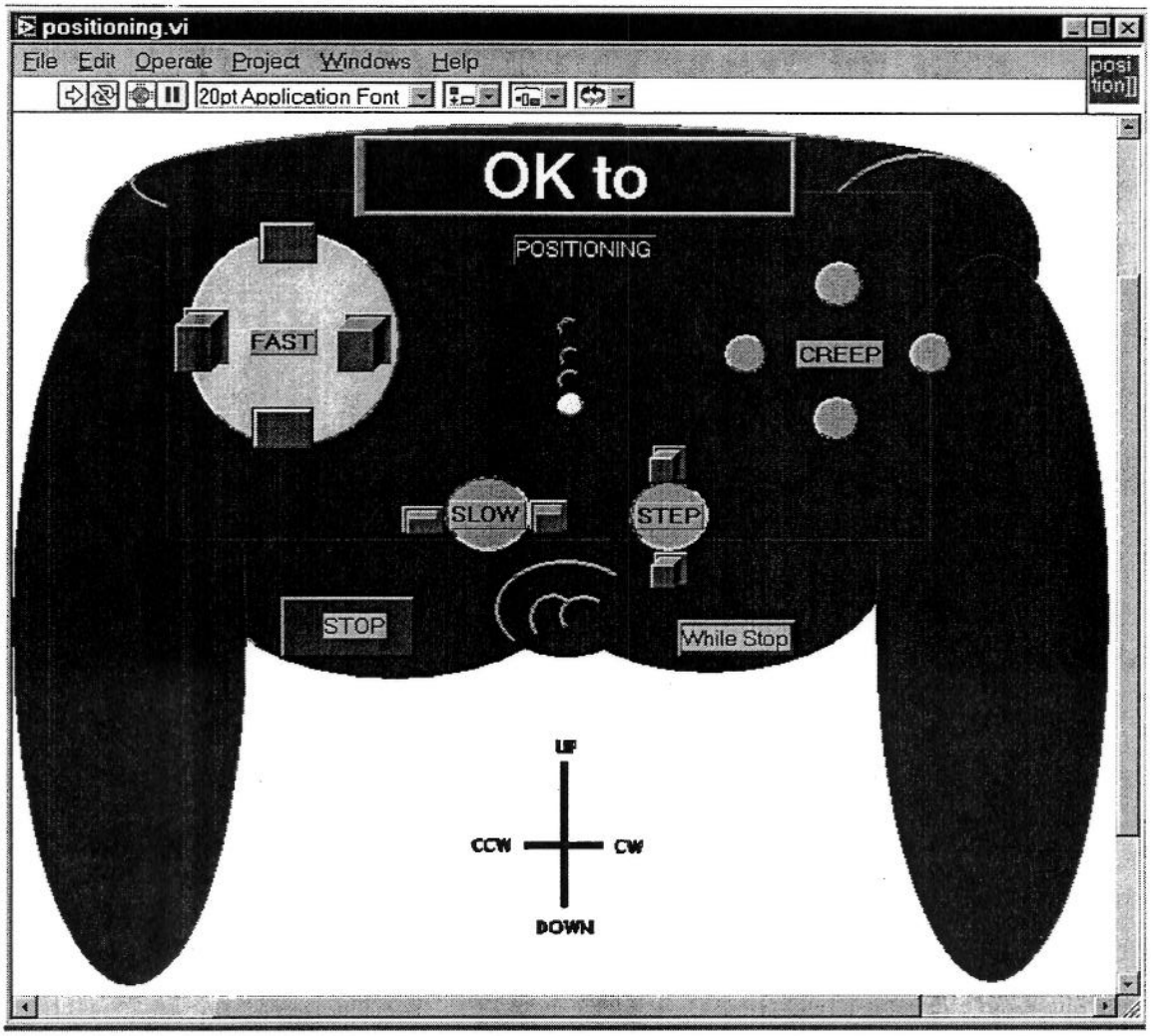

Figure 7 (Positioning program)

8.4. To run the program, click on the white arrow.

8.5. You will then want to use the joypad shown below to control motion of the boom while running the positioning program.

8.6. In order to access the positioning program, toggle the small button in the very center of the joypad until the bottom most light comes on (see figure).

8.7. Make certain that the clamp is raised so that the limit switch is activated, otherwise, the boom will not move.

8.8. At any time, you may move either away from or to the tower, or clockwise or counterclockwise. Move in only one direction at a time.

8.9. Buttons on the joypad are labeled to describe what type of motion they control. The ones labeled "next wire", and "go back" will move the wire-laying head toward or away from the tower by the increment needed to move from one

field wire to the next field wire, (that is the same as needed to go from one anode wire to the next). When using these two buttons, the motion stops automatically after incrementing.

8.10. When using the positioning program, the other buttons allow for continuous motion, until you press the stop button.

8.11. Sometimes you will find that although the clamp is up, no motion occurs when a button is pressed. If this happens you need to return to the control program, and run the "Initialize Comport" program. After doing this, the positioning program should run properly. If "Positioning" still does not work, see the instructions at the end of this document.

8.12. Positioning the wire laying head

8.12.1. Position the wire-laying head over the center pin strip, with the wire-laying head pulleys straddling the anode wire pin of whichever wire you wish to lay.

8.12.2. Using the "Very Slow" buttons which are situated on the underside of the joypad, adjust the pulleys over the pin so that it is centered between them.

8.12.3. Now using the "CCW(Fast)" button, bring the wire-laying head across the panel, and stop it a few centimeters from the comb. With the "CCW(Slow)" button, bring the pulleys through the comb, making sure that it is centered between them, and that the comb is not too high for the wire-head to go over easily.

8.12.4. Now bring the boom back across the panel using the "CW(Fast)" button. Stop the motion a few centimeters away from the comb, and bring the pulleys through the comb using "CW(Slow)". If the pin is centered between the pulleys, and the comb is at the right height, stop the motion once the wire-head is just past the comb, between it and the solder strips that are outside the panel.

8.12.5. Now you are ready to lay wires on the panel.

8.13. With the tensioning procedure complete and the wire-laying head on the clockwise side of the panel, just outside the comb, it is possible to begin laying wires.

8.14. First, go to the "Control Program" and open and run the wire laying program below.

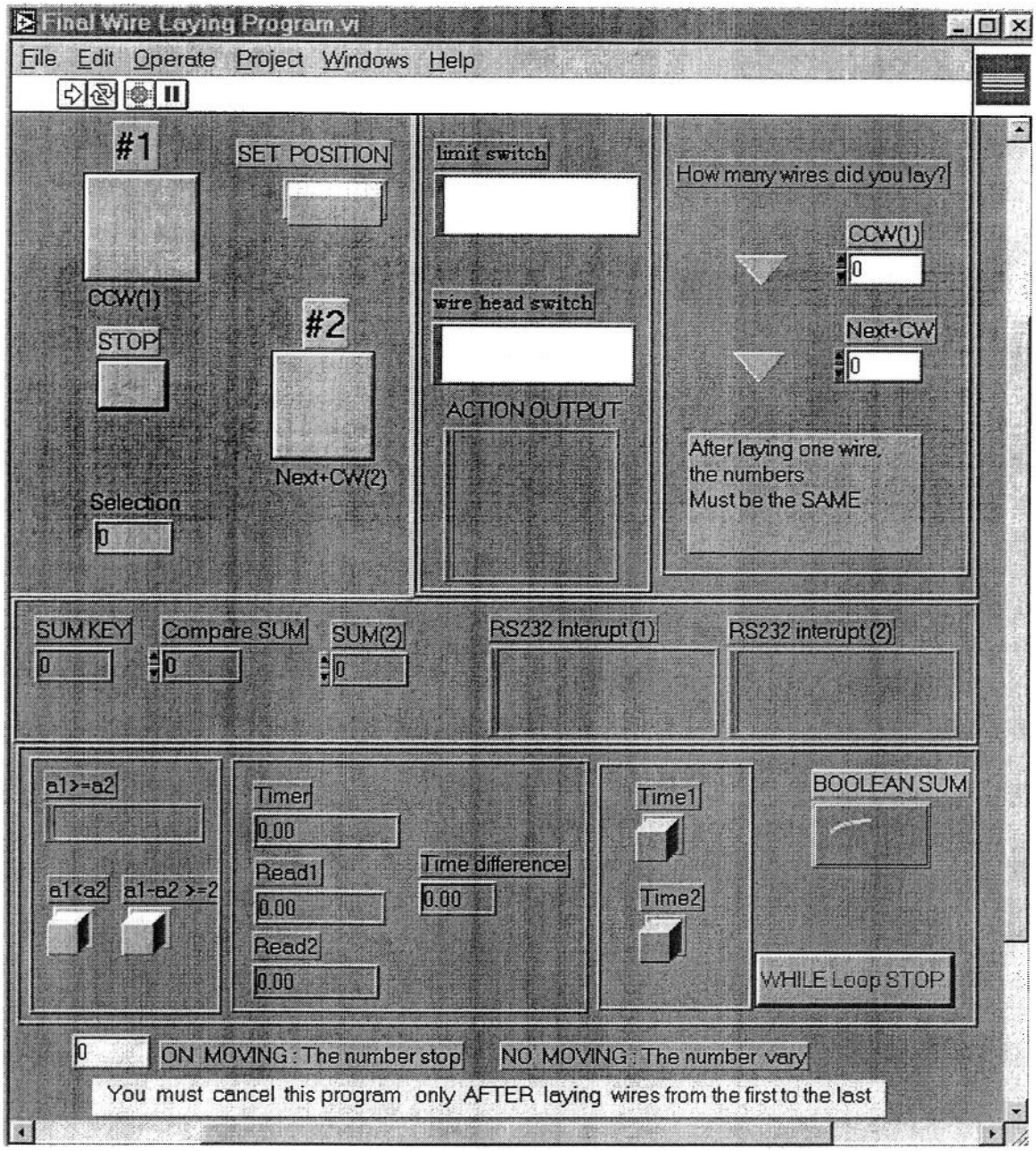

Figure 9 (Wire Laying program)

8.15. The wire laying program can be controlled with the joypad by clicking the center button so that the second light from the bottom comes on. The controlling buttons are shown below.

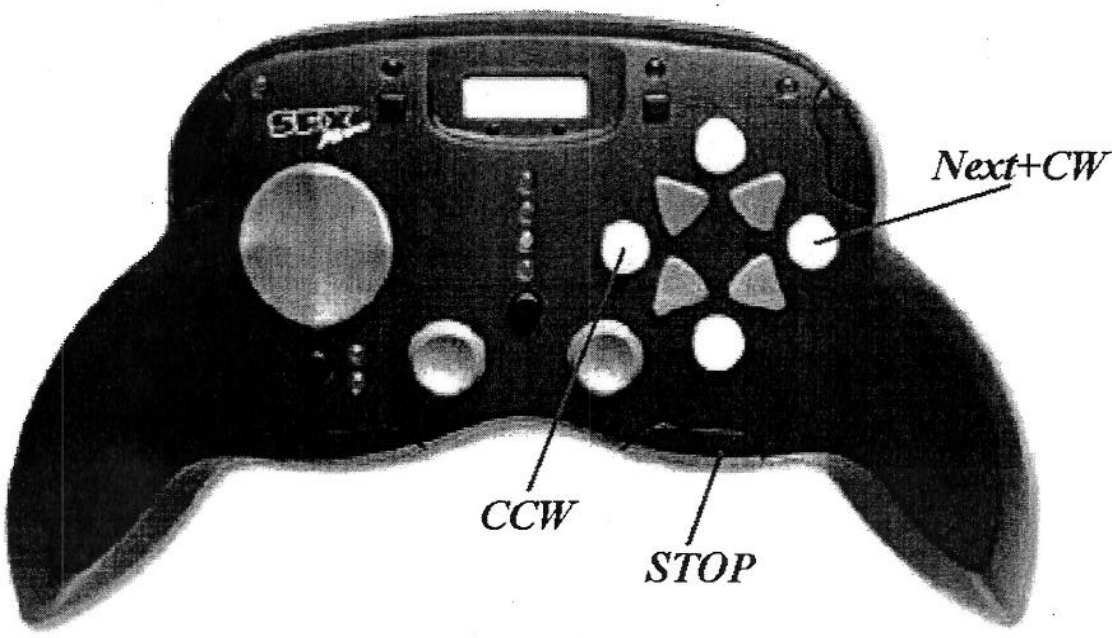

Figure 10 (joypad settings for wire laying)

8.16. Bring the clamp down until the wires rest on top of the outside solder pad strip. Solder the two wires to whichever pads the wires fall on.
8.17. Unclamp the wires and raise the clamp until the limit switch is set.
8.18. On the joypad, press the CCW button to move the wire-laying head to the left side of the panel.
8.19. When the wire-laying head has reached the opposite side of the panel, solder the wires to the anode PC card solder pads on both sides of the panel. Use only the Japanese solder.
8.20. Once the wires are soldered at both ends, slide the clamp horizontally until it is over the wires.
8.21. You may then lower the clamp to the level of the wires and clamp them, or if you find it easier, open the clamp and gently lift the wires up to it by hand. Lifting by hand may make it less likely that the wires will come out of the wire head pulley, especially when the carriage is close in to the tower.
8.22. It may be necessary to gently pull the wires out from the wire-laying head a bit before clamping, and then to let them pull back a little as the clamp is closed around them. The reason for this is that otherwise the anode wire will be stretched by the clamping, and may break.
8.23. After clamping, cut the wires at the solder pad next to the solder so that no extra amount of wire remains.
8.24. Make certain that the clamp is raised so that the limit switch is set, and align the clamp horizontally with the wire-laying head.

8.25. Press the "Next CW" button to move to the next wire position, and to move the wire laying head to the opposite side of the panel again.
8.26. Continue repeating the above steps until all wires are fixed to the panel for that day.
8.27. Once the last set of comb pins is reached, you will need to slide the combs over in order to continue laying wires. To do this, use the positioning program to bring the wire laying head over the center pin where the next wire set is to be laid, then bring the boom across to the most counterclockwise position just before the comb, and slide the comb over so that the second pin is between the two wire-head pulleys. Then bring the wire-head around to the opposite side of the panel, stopping just before the other comb. Position this comb in the same manner. Make certain that the wire-head passes around the comb pins so that when a pin is directly beneath the wire-head pulleys, it is also positioned right between them.
8.28. If a wire breaks while it is being laid down, then both the anode and sense wires should be restrung. If a wire is broken after you have moved on to another set of wires and already laid them, then the wires should be restrung by hand after you have completed the panel.
8.29. Execute the tension measuring procedure.
9. Replace loose wires if necessary.
10. Inspect the center rib with the TV camera, making certain that all wires are at the bottom of the pins.
11. Inspect the solder pads and insure that the wires are cut right next to the pads and that no loose wires exist.
12. Once all wires and solder joints have been judged acceptable, they are to be encapsulated with epoxy.
    12.1. Mix a BIPAX epoxy packet.
    12.2. By hand, squeeze the epoxy over the solder pad so that it covers the entire pad and the area on the chamber side of the pad to about 1mm from the edge of the PC board.
    12.3. Repeat the procedure on the other end of the wire.
    12.4. On station 3, switch to the laying glue program by returning to the "Control Program", and opening and running the "Gluing" program.
13. Affixing wires on center rib
    13.1. Laying glue for station 3
        13.1.1. Mix the BIPAX glue in the 2 cc packet and squeeze the glue into the syringe container.
        13.1.2. Place the syringe onto the boom head and attach the air supply.
        13.1.3. Switch the air supply valve on the side of the boom to the glue position.
        13.1.4. Position the syringe over the start point on the center rib.
        13.1.5. Lay glue on the correct number of wires.
        13.1.6. Remove the syringe and place the air supply valve back to the wire laying position.
    13.2. Placing cap on station 2:
        13.2.1. Clean center rib cap with alcohol.
        13.2.2. Mix the BIPAX in the 2 cc packet.

13.2.3. Place a small amount of glue on both edges of the center rib cap
13.2.4. Carefully place the center rib cap over the pins and onto the wires.

14. Repeat items 7. To 13. until all of the wires are placed on the panel.
15. Trouble Shooting
    16.1 If at any time a given command is not executed, follow these steps:
        16.1.1 First, go back to the "Control" program and run it.
        16.1.2 Next, click on the "Initialize Comports" button to run the initializing program.
        16.1.3 Return to the original program that you were running and attempt to run it.
        16.1.4 If the program still does not execute, repeat the above steps.
        16.1.5 If this is not successful, close all LabView programs, turn off the power supply box for the motors, and open the HyperTerminals by clicking on their icons. Once the HyperTerminal windows are open, turn the power back on. Messages as shown below should be displayed. Once these messages are observed, close the HyperTerminals.

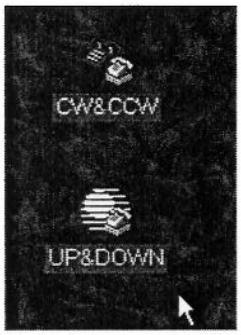

Figure 11 (HyperTerminal icons)

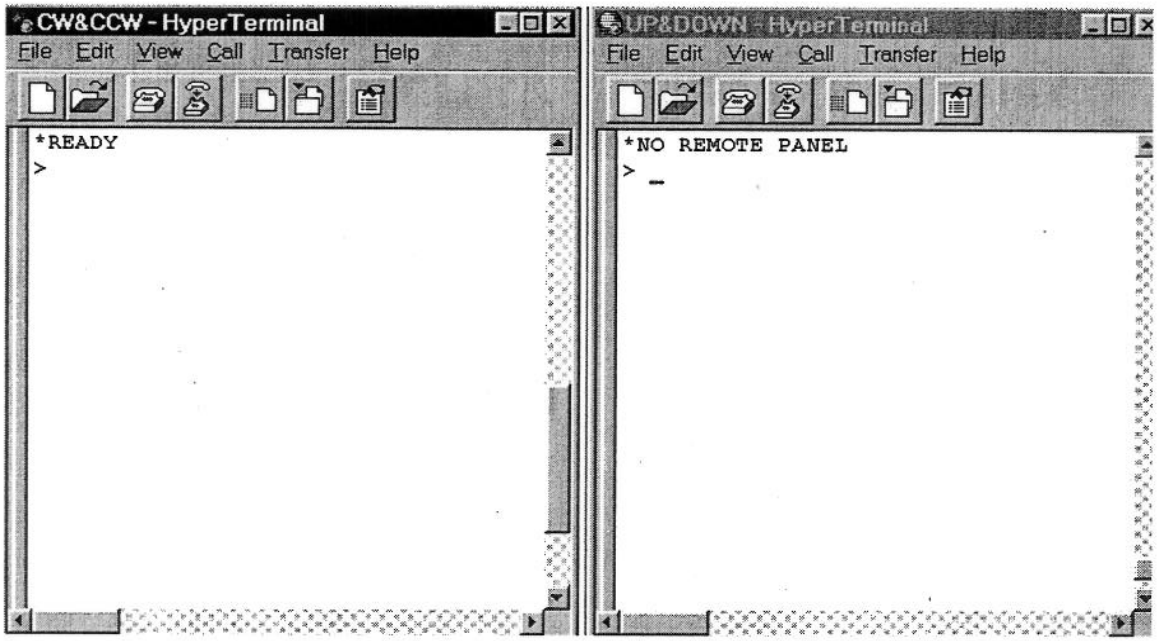

Figure 12 (HyperTerminal windows)

16.1.6 If the program does not execute after this, shut the computer down and restart it, then repeat step 16.1.5.

16.1.7 Return to the desired program and run it.